AMENDMENT NO. 1 TO THE PROJECT SUMMARY HOPI ARSENIC MITIGATION PROJECT HOPI INDIAN RESERVATION NAVAJO COUNTY, ARIZONA

PROJECT NO. PH 18-V31
PUBLIC LAW 86-121

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
INDIAN HEALTH SERVICE
PHOENIX AREA OFFICE

JULY 2019

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INTRODUCTION

In November 2010, the Hopi Tribe requested assistance from the Indian Health Service (IHS) to advance an arsenic mitigation strategy addressing water quality issues affecting residents of the First and Second Mesas on the Hopi Indian Reservation. To date, several projects have been approved to provide for the Hopi Arsenic Mitigation Project (HAMP). Two wells (Turquois Trail Well Field) have been drilled which produce water meeting all of the Environmental Protection Agency (EPA) primary drinking water standards. These wells have not been connected and there are currently 778 homes being served water from systems that do not meet the Maximum Contaminant Level (MCL) for arsenic. There are an additional 91 homes that are expected to receive water service from these wells. Therefore, this project directly serves 869 homes. This project may also serve homes in communities that have no water system connections due to cultural reasons. Water is typically hauled from the nearby existing water system hydrants. There are also homes that have been disconnected from their water system that may be reconnected at some point

A regional water system will convey water from the Turquoise Trail Well Field to the villages at First and Second Mesa. The project will construct two pumphouses, three regional water storage tanks, two booster pump stations, 217,500 feet of transmission pipeline, a utility management and maintenance building, and equip two wells with pumps and chlorination facilities.

The estimated cost to complete the project is $20,500,000, or $26,350 per home. This total cost does not include the powerline extension to the wells that the Tribe (via Hopi Utility Corporation) has committed to manage and fund with $1,059,402 that was previously authorized by Tribal Council Resolution. The IHS contributed $11,000,000 in fiscal year (FY) 2018 "Regular" funds and the Environmental Protection Agency (EPA) contributed $3,000,000 through a FY 2018 Drinking Water Tribal Set-Aside (EPA-DWTSA) grant. Under this project amendment, the IHS is contributing $2,000,000 through "Regular" funds to the project and EPA is contributing $1,800,000 through EPA-DWTSA. If future agency budgets allow, IHS and EPA will address the projected project funding shortfall of approximately $2,700,000. Any additional costs associated with the extension of power to the Turquois Trail Wells will likely remain the responsibility of the

Tribe.

The Turquoise Trail well field is located approximately 14 miles north of the Hopi Cultural Center. Water would be delivered to each of the affected villages via a regional water transmission system. A new utility authority, the Hopi Utilities Corporation (HUC), has been established to manage and operate the proposed facilities. Each Village will maintain ownership of, and continue to operate and maintain their respective water distribution systems, and will purchase bulk water from the regional utility through master water meters. In this model, the HUC will act as a water wholesaler to the three village water utility providers. Homes that are not currently on the community water systems may either be served by the HUC directly as customers or by extensions from the existing water systems. Future operational agreements between the HUC and Villages may lead to HUC operation of village systems.

EXISTING SANITATION FACILITIES

Water Supply: In January 2001, the USEPA reduced the drinking water MCL for arsenic from 50 ppb to 10 ppb. Effective January 2006, all public water systems were required to meet this revised standard. Since 2006, the tribal water systems serving the Hopi Villages of First and Second Mesa have been out of compliance with regard to arsenic. Arsenic concentrations in the First and Second Mesa area range from approximately 12 ppb to 20 ppb.

Three of the affected villages (Shungopavi, Sipaulovi, and the FMCV) signed Compliance Plans with the USEPA, Region 9, in 2011, agreeing to bring their respective water systems into compliance with the arsenic MCL by January 23, 2015. None of the PWSs have complied with the arsenic MCL to-date, resulting in the Hopi Tribe and PWSs receiving EPA Enforcement letters in January 2017. The Tribe and PWSs received Finding of Violations letters in February 2017 with a deadline in March 2017 to agree to negotiate Administrative Orders on Consent (AOCs) with the EPA.

The PWSs notified of arsenic MCL violations are as follows:

- Hopi Cultural Center, PWS ID#0400260;
- Sipaulovi (Upper Sipaulovi/Mishongnovi), PWS ID#0400394;
- Polacca, PWS ID#0400106;
- Shungopavi, PWS ID#0400259;
- Sipaulovi (Lower Sipaulovi/Mishongnovi), PWS ID#0400107.
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The villages served by the PWSs are the First and Second Mesa Villages of Mishongnovi, Polacca, Shungopavi, Sichomovi, Sipaulovi, Tewa, and Walpi. See Existing Facilities Production, Table 4.1 below, for information on the number of water system connections and data. The "other" use column includes actual water use by businesses and estimated water hauling use.

TABLE 4.1 – Existing Facilities Production Data

Village Utility	No. Residential Service Connections	2017 Production (gals./year)	Average "Other" Usage (gal./mo.)	Production (gal./residential connection)	No. of EDUs	Production (gal./EDU)	Gal./day/EDU	Persons/Residential Connection (2010 US Census)	Daily Per Capita Usage (gal./person/day)
Shungopavi	160	9,333,792	30,417	4,671	167	3,293	154	4.1	37
Sipaulovi / Mishongovi (lower)	107	8,057,000	30,417	5,991	112	5,654	197	3.9	51
Sipaulovi / Mishongovi (upper)	34	1,607,314	30,417	3,045	44	2,412	100	3.9	26
FMCV	477	54,887,200	489,435	8,563	534	8,563	282	3.6	78
Totals	778	73,885,306			857				
Averages						*7,168	*236	3.8	64
* weighted average									

In June 2006, the Hopi Tribe received a USEPA Drinking Water Tribal Set-Aside grant to develop a feasibility study to explore arsenic mitigation compliance strategies (IHS Project PH06-D33). Through an MOA, the Hopi Tribe requested that the Indian Health Service assist the Tribe in completing an arsenic mitigation study for the First and Second Mesa region. Based on the findings of this investigation, the IHS recommended that arsenic treatment options be avoided to the greatest extent practical and that the arsenic mitigation focus should be directed to non-treatment options. Conveying arsenic compliant water from a proposed well field in the Turquoise Trail region was deemed the preferred strategy for addressing the area's ongoing arsenic compliance challenges. This concept became known as the Hopi Arsenic Mitigation Project.

In 2008, the IHS funded a project to further assist the Tribe in developing the HAMP concept (IHS Project PH08-T38). The project was funded specifically to evaluate the existing Hopi water systems, determine pipeline routes and alignments, identify right-of-way issues, and to conduct an environmental assessment of the HAMP.

In 2010, the Tribe received a DWTSA grant for $1.9M (IHS Project PH10-E37) to further explore and substantiate the HAMP concept. At the Tribe's request, these funds were managed by IHS under an interagency agreement between the IHS and EPA. The scope of work defined in the 2010 DWTSA grant

included a hydrogeologic study, a utility management plan, and well drilling activities in the Turquoise Trail area.

In 2011, the USEPA awarded the Tribe another DWTSA grant, for $1.1M (IHS Project PH11-E55), and in 2012 awarded the Hopi Tribe an additional DWTSA grant for $1.2M (IHS Project PH 12-E73), which provided funding for additional planning activities and construction funding for a portion of the HAMP. The Tribe received another EPA-DWTSA grant for $985,000 in 2014 (IHS Project PH 14-U62) to begin construction of the HAMP in the vicinity of Upper Sipaulovi and Upper Mishongnovi. Project PH 14-U62 money is five years old and EPA is requesting that the money be returned. The Tribe also received an EPA-DWTSA grant in 2015 for $700,000 (IHS Project PH 15-U76) to improve water facilities in the Village of Polacca as part of HAMP. Project PH 15-U76 is now considered to be a tank replacement project and a separate undertaking from the HAMP.

Turquoise Trail Well#2 and Well#3 have been drilled and are capable of providing at least 300 and 321 gpm respectively.

Shungopavi - The existing Shungopavi water system consists of one well which produces approximately 65 GPM and one 250,000-gallon elevated WST which was built in 2011. At base level, there is a single bi-directional distribution main filling and draining the WST. However, there are separate inlet and outlet lines which fill directly up into and draw down from the elevated storage volume of the WST. The fill and draw lines are equipped with flow directional check-valves to induce tank volume turnover and thus reduce stored water age. A single pressure zone, based on "floating" head from the WST serves all of the Shungopavi system.

A new well was drilled in Shungopavi in 2008, but that well produced water with elevated arsenic concentrations of 33 ppb and elevated gross alpha. For that reason, the new well was not put into service. The Shungopavi water system continues to source its SDWA As MCL non-compliant water from the existing village well which was drilled 49-years ago in 1969.

The Shungopavi water system currently serves 160 residential service connections, no commercial customers, and five "other" water service connections. Not all Shungopavi residences currently have water service and 83 full time Shungopavi homes use Shungopovi yard hydrants as a source for hauled water. 51 of these homes live along state route 264 where a sewer preliminary engineering report is looking into how to serve these homes with sewer facilities.

Upper Mishongnovi/Sipaulovi - The Upper Sipaulovi/Mishongnovi water system consists of two pressure zones, one well which produces approximately 9 GPM, one 16,000-gallon water storage tank and one hydro-pneumatic tank with a 1½ hp booster pump. The Upper Sipaulovi/Mishongnovi well was drilled in 1979 and it is currently 39-years old.

The Upper Sipaulovi/Mishongnovi water system currently serves 34 residential service connections, no commercial connections, and five "other" water service connections. Not all Upper Sipaulovi/Mishongnovi residences have piped water service. Some of the village homes haul water from centrally located yard-hydrants.

Lower Mishongnovi/Sipaulovi - The Lower Sipaulovi/Mishongnovi water system consists of a single well which produces approximately 90 GPM, a 75,000-gallon water storage tank, and a gravity-fed distribution system. The WST, build in 1978, was completely rehabbed and recoated internally in 2014. Sipaulovi's distribution system is connected to the BIE Second Mesa Day School water system through a normally closed gate valve which allows emergency gravity-flow service to the school from Sipaulovi if needed. The Lower Sipaulovi/Mishongnovi well was drilled in 1978 and it is currently 40-years old. This well was videoed in 2002 and was in good condition at that time.

The Lower Sipaulovi/Mishongnovi water system currently serves 107 residential service connections, three commercial service connections, and five "other" water service connections. Not all Lower Sipaulovi/Mishongnovi residences currently have piped water service to their homes.

Polacca (First Mesa Consolidated Villages, FMCV) - The existing FMCV water system is configured into four pressure zones. Drinking water for the entire system is currently produced from two functioning wells, which are identified as well nos. 5 and 8. These wells have capacities of approximately 110 and 100 GPM respectively. Older FMCV well nos. 1, 2, 3 and 4, and 7 are inactive/abandoned.

The FMCV well no. 5 is currently in service and well no. 6 is out of service. According to the 2016 Sanitary Survey by Sleeping Giant Environmental Consultants, LLC, when the well no. 6 pump failed, the pump and drop pipe were removed but were never replaced. The use of well no. 5 currently meets EPA standards for supply adequacy, but not for As MCL compliance. Well no. 6, which is also not As MCL compliant, should be re-equipped with a pump and drop-pipe to remain on stand-by for system redundancy. Wells no. 6 is said to produce a lesser quality of water than well no.5, even though the two wells are sited less than 600-feet apart and are drilled to the same approximate depths. Well nos. 5 and 6 were constructed in 1986 and are currently 32-years old. Well no. 8 was constructed in 1988 and is currently 30-years old.

Pressure Zone No. 1 is the uppermost zone of the FMCV system and it services the homes on top of the mesa. Subsequent zones are labeled in order of

decreasing elevation. Pressure Zone No. 1 has an 8,500 gallon storage tank and four (4) 120-gallon hydro-pneumatic tanks which are pressurized by parallel booster pumps. Pressure Zone No. 2 consists of a 500,000 gallon WST (Polacca East Tank) fed by Well No. 8 and provides service to a few higher elevation homes located below the mesa. A booster station pumps water from Pressure Zone No. 2 up to the mesa top (Pressure Zone No. 1) through parallel booster pumps. Pressure Zone No. 2 also supplies Pressure Zone No. 3 through two pressure reducing valves (PRV Nos. 8 and 9) and generally serves the majority of Polacca homes north of Highway 264. Pressure Zone No. 3 feeds Pressure Zone No. 4 through a series of five PRVs (PRVs Nos. 6, 4, 3, 2, 1) located along and just north of Highway 264. Pressure Zone No. 4 generally serves homes south of Hwy 264 and east of the Hopi Health Care Center/Polacca West System which is served by the 250,000 gallon Polacca West WST, Well No. 5, and, when in back-up mode, by Pressure Zone No. 3 through PRV No. 7.

The FMCV Water System currently serves 477 residential service connections, 16 commercial connections, including the First Mesa Elementary School, Dialysis Center, and the Hopi Health Care Center. Not all residences within the FMCV service area have water service at this time.

BIA Water Systems – BIA have shown interest in connecting to the HAMP water system but have not committed any funds to become part of the project. BIA's Hopi systems include the Keams Canyon Water System, the Hopi Junior/Senior High School Water System, and the Second Mesa Day School Water System. The proposed facilities listed in this report were not designed to include demands from the BIA systems. BIA is not listed on the MOA for this project.

BIA Keams Canyons PWS - The BIA Keams Canyon Agency operates an AdEdge adsorptive media arsenic removal plant. Prior to filter vessels, raw water is injected with CO2 gas to lower the pH from 9.0 to 7.0-7.8. Sodium hypochlorite solution is then injected for disinfection and oxidation of the dissolved arsenic. Post-treatment pH adjustment was not included in the design. The treatment plant came online in April 2012. The treatment plant design capacity is 150 gallons per minute (gpm). The average daily demand is estimated to be 62,500 gpd. The filter vessels are backwashed every sixty days and they recycle the backwash back through the plant.

The PWS consists of two supply wells, a booster pump station, and two water storage tanks.

The BIA Keams Canyon System existing piping has several breaks each year.

Second Mesa Day School - The Second Mesa Day School first commissioned its Isolux adsorptive arsenic treatment system on June 5th, 2007. This is also

a booster pump building and a 50,000 water storage tank on the system. Hopi Junior-Senior High School - Hopi High School has operated its reverse osmosis plant since 1998. In 2010, two KDF Isolux cartridge pre-filters were added. One to remove particulates and chlorine and the other to reduce metal concentrations. There is a 250,000 gallon elevated storage tank on the system.

Addition or upgrades facilities may be needed to connect BIA to the HAMP regional water main. This may include a well with connection, additional HAMP system storage near Hopi Tank 1, a Keams system storage tank near their 2 existing wells with an altitude/flow control valve, and a few miles of HAMP waterline upgrade from 12" to 14" pipe.

B. Wastewater Disposal: Wastewater collection and disposal on the reservation is accomplished through a number of different methods. Seven of the villages have collection systems while only six operate disposal facilities. At Keams Canyon, the BIA operates both a collection system and disposal facility. Two of the schools have both a collection system and disposal facility and one school has only a collection system. Two Tribal facilities exist for collection and disposal. All of the disposal facilities are designed to be total retention. Most scattered homes are served by septic tank and drainfield systems. Outhouses are used extensively in older village areas.

Second Mesa School - Wastewater disposal for the school compound and surrounding houses consists of a 1.0 acre stabilization pond. The Mishongnovi-Sipaulovi pond also provides wastewater disposal for part of Toreva.

Polacca (First Mesa Consolidated Villages, FMCV) - The FMCV's wastewater disposal system includes a six cell lagoon treatment system totaling 9.9 acres, with 14.8 acres of wastewater disposal area, making the total area of the wastewater treatment facility 24.7 acres. The facilities serve approximately 450 homes and 10 businesses.

C. Solid Waste Disposal: Residents utilize the services of the Hopi Solid Waste Management Program. The Tribe previously operated a landfill, which has been closed and replaced with a transfer station. The transfer station is near the Navajo Boundary by Hard Rock and solid waste is then taken to the Painted Desert Landfill near Joseph City, approximately 100 miles from the Transfer Station.

RECOMMENDED FACILITIES

A. Water: This project will help make up the $5.8 million more that is needed to complete the 2018 HAMP Project PH 18-V31 scope of work. Construction costs have escalated in the last two years adding to the cost of this project. EPA and IHS have both stated that they will try

and contribute funds for the remaining $2.7 million. The full scope of work is about 41 miles of pipeline, 3 new water storage tanks, equipping 2 wells, disinfection and pump house facilities, 2 booster stations, and system controls.

B. Sewer: No wastewater disposal facilities are recommended under this Project. Projects are underway or are being planned to improve sewer facilities on the Reservation.

C. Solid Waste: No solid waste facilities are recommended under this Project. Existing facilities are adequate.

ENVIRONMENTAL CONSIDERATIONS

An environmental assessment, funded under IHS project PH 11-E55, has been completed. An amendment to the environmental assessment will be necessary that specifies the recommended alignment as the "Hybrid". Most of the "Hybrid" alignment was included in the environmental assessment and it has been archaeologically cleared, but Village and Tribal concurrence of the alternative is needed. The water system from the well to each villages' respective tanks would be under the management of the HUC. There are some segments of the "Hybrid" that have a change in location from what was previously cleared in the Environmental Assessment. Any reroutes will require an archaeology addendum and Threatened and Endangered Species addendum. Alternative A would have had similar archaeology and Threatened and Endangered Species addendum requirements.

OPERATION AND MAINTENANCE (O&M)

The proposed facilities constructed under this project will be operated and maintained by a Tribally endorsed management entity, the Hopi Utilities Corporation (HUC). The HUC was chartered for incorporation on June 6th, 2017 by the Hopi Tribal Council. The project will provide for a HUC management and maintenance facility, utility vehicle, O&M equipment and tools, and necessary training.

COST ESTIMATE - The total estimated cost to construct the HAMP is estimated to be $20.5 million. IHS, EPA, and the Hopi Tribe have made contributions toward the HAMP. Future funding in the approximate amount of $2.7 million is needed to complete the project. It is anticipated that construction will be completed by the Tribe through Tribal procurement or 638 Contract. Any work to be constructed through Tribal procurement will be approved in accordance with the MOA. Any work to be constructed through 638 Contract will be approved in accordance with the, yet to be executed, 638 contract.

Final Design (Plans, Specs., Contract Package)	$1,350,000
Water Mains	$11,500,000
Wells and Pump Houses	$1,115,000
Booster Stations	$825,000
Water Storage Tanks	$1,615,000
HUC Admin Building	$350,000
Power Extension from Wells to Tank 1	$810,000
Post Construction (Equipment/O&M manual)	$95,000
Subtotal	$17,660,000
Contingency (10 percent)	$1,766,000
Construction Total	$19,426,000
Tribal Administrative Fee	$391,000
Tribal TERO Fee	$583,000
Total to Tribe	$20,400,000
IHS Environmental Activities	$100,000
Project Total	$20,500,000
2018 IHS Funding	$ 11,000,000.00
2019 IHS Funding	$ 2,000,000.00
2018 EPA Funding	$ 3,000,000.00
2019 EPA Funding (Anticipated)	$ 1,800,000.00
Total Funded	$ 17,800,000.00
Total Funding Shortfall	$2,700,000.00

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